INDIAN MARITIME UNIVERSITY
(Central University, Government of India)

May/June 2016 End Semester Examinations
B.Tech. (Marine Engineering)

Third Semester – Strength of Materials - II (UG11 2304/T1304)

Date : 27.06.2016 **Max. Marks: 100**
Time: 3 Hrs

Part – A **(3 X 10 = 30 Marks)**
Compulsory Question

1) a) Explain double integration method for finding slope and deflection.
b) In case of deflection of a curved bar , state the relation between length of the curved beam and bending moment.
c) State the advantages of a compound cylinder with respect to the single cylinder having same thickness.
d) What is short column and long column?
e) Define Poisson's ratio and Hooke's law?
f) Define principal stress and principal plane?
g) State the two theorems in moment area method.
h) Define Castigliano's theorem.
i) Write the equation for strain energy stored in a shaft due to torsion
j) Write Gordons formula for the critical load of the column?

Part-B **(5 x 14 = 70 Marks)**
Answer Any Five of the following

2) A steel tube having outside diameter 5cm, bore 3cm is bent into a quadrant of 2m radius. One end is rigidly attached to a horizontal base plate to which a tangent to that end is perpendicular , and the free end supports a load of 100kg. Determine the vertical and horizontal deflections of the free end under this load. E = 208,000 N/mm^2. (14 Marks)

3) a) Explain the procedure of finding slope and deflection of a beam by Moment –Area Method.
b) A beam AB of length L, simply supported at ends A and B carries a udl of intensity w throughout its length. Determine slope at A by moment area method. (6+8 Marks)

4) An axial pull of 40kN is acting on a bar consisting of three sections of lengths 300mm, 250mm and 200mm and of diameters 20mm, 40mm and 50mm respectively. Find (i) the stress in each section and (ii) total extension of the bar. E = 2 x 10^5 N/mm^2. (14 Marks)

5) A beam with a span of 4.5 meters carries a point load of 30kN at 3 meters from the left support. If for the section, I_{XX} = 54.97 x 10^{-6} m^4 and E=200 GN/m^2, find: (i) The deflection under the load, (ii) The position and amount of maximum deflection. (14 Marks)

6) A simply supported beam of I – section, 4m long, carries a total uniform load of 40kN and a concentrated load of 70kN at mid span. (i) Find the maximum deflection of the beam. (ii) If permissible deflection is limited to 1/360 of the span, is the beam acceptable based on deflection? (iii) Find slope at the ends. Take $E = 2.1 \times 10^8$ kN/m^2; $I = 8.98 \times 10^{-5}$ m^4. (14 marks)

7) A fixed beam of 6m span is subjected to a concentrated couple of 150 kNm applied at a section of 4m from the left end. Find the end moments from the first principles. Draw B.M and S.F diagrams also. (14 Marks)

8) A steel cylinder of 1000 mm inside diameter is to be designed for an internal pressure of 4.8 MN/m^2. Calculate: (i) The thickness if the maximum shearing stress is not to exceed 21MN/m^2. (ii) The increase in volume, due to working pressure, if the cylinder is 7m long with closed ends. Neglect any constraints due to ends. Take E=200 GN/m^2, Poisson's ratio = 1/3. (14 Marks)

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